

FIELD STUDIES OF SIX SOUTHERN AFRICAN SPECIES OF *ERYTHRINA*¹

A. JACOT GUILLARMOD,² R. A. JUBB,³ AND C. J. SKEAD⁴

ABSTRACT

The *Erythrina* species of southern Africa range from small suffrutices to tall trees, up to 24 m in height. One species is a geophyte. All possess brightly colored flowers in the scarlet, crimson and orange range, while some species produce a few plants bearing cream or almost white, pink, and a variety of red flowers. All species discussed appear to produce a fair to plentiful supply of nectar, and, from observation, several species of indigenous and exotic birds are the pollinating agents. The two species of *Erythrina* sect. *Humeanae*, *E. humeana* and *E. zeyheri*, which have flowers that resemble those of the American hummingbird-pollinated species of the genus, are visited by sunbirds and white-eyes, whereas larger birds are also frequent at the flowers of the other species. The means of distribution of the usually brightly colored and poisonous seeds is unknown as yet.

Some of the southern African *Erythrina* species have been known in cultivation for a considerable period of time. *Erythrina humeana* was grown in Europe more than 150 years ago, while one species, possibly *E. caffra* or *E. lysistemon*, has been grown on the island of St. Helena for perhaps that length of time. Both these species grow easily from truncheons, and one can often see in southern Africa lines of such trees where they were once planted as protective fences or fence posts.

That so little is known of the biology of these species is therefore surprising. The following observations have been compiled from casual observations by the authors and are supplemented by information gleaned from various books (Acocks, 1975; Batten & Bokelmann, 1966; Coates Palgrave, 1977; Gledhill, 1969; Hennessy, 1972) and that supplied by Mrs. E. F. Hennessy. Careful study may, quite possibly, alter some of these observations.

DESCRIPTION OF SPECIES

Erythrina acanthocarpa E. Meyer is a low (about 1.5 m) straggling, very prickly-stemmed shrub, deciduous (as are all the other species), confined to an area of dry *Cymbopogon-Themeda* grassland around Queenstown, eastern Cape Province (Fig. 1) where it grows in quantity in some places. It is subject to frost and occasional snow. The leaves, bearing hooked prickles on the veins at the back of the leaflets, appear at the same time as the inflorescences, in October–November—that is, in the southern African context, late spring. The flowers are borne on a stout peduncle produced on a short side shoot below the top of the shrub, or, less often, apparently terminally. The racemes are fairly densely packed and held

¹ Many of the observations reported here come from Mrs. E. F. Hennessy (Department of Botany, University of Durban-Westville, Durban, South Africa) and we express our grateful thanks to her.

² Institute for Freshwater Studies, Rhodes University, Grahamstown, South Africa.

³ C/o Albany Museum, Grahamstown, South Africa.

⁴ Florence Street, Grahamstown, South Africa.

in an upright or lateral position, and there are usually only one or two on each short shoot. The flowers have a green calyx and a vermilion red standard tipped with yellow lined by green veins. The minute alae are white, as are the carinal petals, but these, also small, have long, pointed pale pink tips just exceeding the calyx tube in length. The flower tends to open only slightly to expose the stamens and stigma. The brown pod (to 12 cm long or more) is densely covered with sharp prickles and contains large (20 mm diam.) brown red seeds, often attacked by the larvae of a pyraustine moth (Pyralidae).

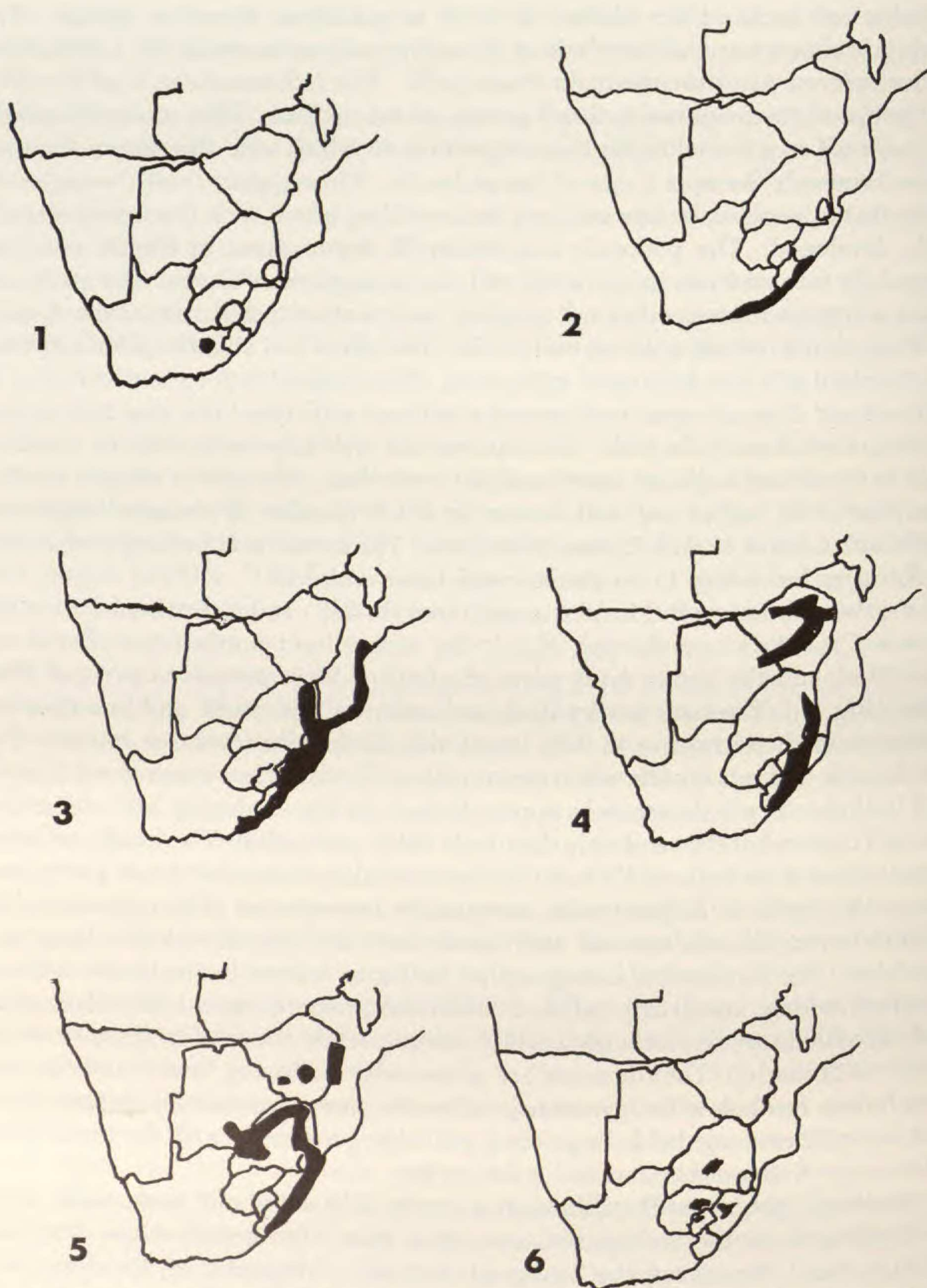
Erythrina caffra Thunberg is a tall (to 24 m) tree characteristic of coastal plain forests and temperate forests in the area from the eastern Cape Province through the Transkei to the Natal South Coast, and perhaps up into Zululand (Fig. 2). As this species and *E. lysistemon* have often been confused, the distribution may not include Zululand. This tree forms part of the canopy layer in forests. The trunk is, as with other southern African species, soft barked and light grey in color, while the wood is very porous and light, rotting readily. The leaves of each season are borne at the ends of the branches or at the tips of short side shoots and do not have hooked thorns on them, though the younger branches are armed with dark purple prickles. The leaves are subject to attack by gall-forming insects—chalcidoid hymenopterans. The flowers appear either before the leaves or with the developing leaves, in mid to late winter (July–October). They are borne in densely packed inflorescences on stout peduncles from strong shoots, usually four or five to a shoot. These heads are borne at angles from the vertical of about 45° , to horizontal, to completely upside down, i.e., 180° from upright. If horizontally placed, the flowers tend to be somewhat secund towards the upper side of the peduncle. The calyx is a velvety dark brown or dull green, the standard a rich vermilion or even crimson, the relatively small alae a greenish brown. The carinal petals are sometimes much the same color as the alae, or they may be tinged with the same red as the standard, or be, most often, purple bordered with green or orange. This is the only species among these six southern African erythrinas in which the alae and carinal petals are fully exposed, because of the very much reflexed standard in the newly opened flower. When the flower reaches anthesis, the stamens spread out in a fan shape, the style resting above them, and the flowers themselves are held almost at right angles to the peduncle. On fading, the standard resumes a position covering the other petals while the stamens and stigma project beyond the end of this petal. The pod is a dark brown, sometimes almost black organ, less than 1 cm wide and contains brilliant red orange seeds with a black hilum area. Color varieties occur occasionally. Flowers may have cream, pale pink or a variety of red shades in the standard, with corresponding alteration of the colors of the other petals. Nectar is produced in great quantity but is neither particularly sweet nor sticky. It is either colorless or slightly yellow or brown tinged. It appears as a bubble of liquid at the base of the androecial fan, held between that and the alae, and, to some extent, the carina.

Erythrina humeana Sprengel is a shrub of upright growth, reaching about 2 m in height, and occurs on forest margins from the coastal and midland areas of the eastern Cape Province through to Moçambique, including Natal, the north-eastern and eastern Transvaal, and Swaziland (Fig. 3). Except for the leaf

petioles and backs of the leaflets, it is not as prickly as the other species. The dark green leaves are, as are those of *E. caffra*, subject to attack by a chalcidoid hymenopteran parasite which produces galls. The inflorescences tend to occur at the tips of the branches, in small groups of two to four. They are held upright or may tend to a lateral or horizontal position, in which case the flowers become secund towards the upper side of the peduncle. They appear from December to May, that is, summer to late autumn, and are thus borne with the leaves already fully developed. The peduncle may reach 50 cm or more in length and may carry fully formed fruits below while still producing flowers above. This peduncle bears warty excrescences but not prickles, and is often a dull red on the flower-bearing portion, shading to green basally. The calyx is a slightly paler red than the standard or it may be tinged with green. The standard is deep scarlet fading to crimson and does not open to expose the stamens and style. The alae and carinal petals are small and pale pink. The stamens and style appear beyond the standard only as the flower fades, or sometimes not even then. The pod is slightly smaller than that of *E. caffra* and dark brown to black in color; it contains bright red seeds with a black or dark brown hilum area. The nectar is not as copious as that of *E. caffra* but seems to be sweeter and honey colored.

Erythrina latissima E. Meyer is a small tree (to 8 m) and is distributed from the eastern Cape Province through Natal, the eastern and northeastern Transvaal, Swaziland, and the higher lying parts of southern Moçambique to parts of Rhodesia (Fig. 4). The bark is very thick and corky and the trunk and branches are greater in diameter relative to their length than in the other two tree species. The wood is soft and rots rapidly when the tree dies. The large leaves are greyish green and leathery. The inflorescences appear before the leaves, during late winter into spring (September–November); they have thick peduncles. The heads are most often carried at an angle of 45° to 90° to the vertical, and there are fewer per branch than in *E. caffra* or *E. lysistemon*, comparable tree species. The calyx is red or reddish brown, densely covered with woolly hairs and tipped with five long, narrow lobes. The standard, of a deep scarlet fading to crimson as the flower withers, is spread widely and partly reflexed when the flower is open. The alae, small and concealed, are scarlet with a white margin, while the keel is greenish white tinged with scarlet. The filaments are green yellow, bearing brown anthers, and they form a fan below the gynoecium when the flower opens. The brown black pod, up to 30 cm long, holds large (to 2 cm diam.) red seeds with the usual black hilum area. Nothing is known about the nectar.

Erythrina lysistemon Hutchinson is a tree to 8–10 m tall and is the most widely distributed of the six species, occurring from the eastern Cape Province through Natal, Swaziland, the Transvaal, Botswana, Moçambique, Rhodesia, and Malawi to Zambia (Fig. 5). The trunk is dark grey, the branches are armed with numerous prickles, and, unlike *E. caffra*, the petiole and veins on the undersurface of the leaflets are also provided with thorns. The inflorescences appear in winter to early spring (August–October). They are usually laterally oriented, though a few may be at 45° to the vertical or almost upright. There is a strong tendency to subsecund arrangement of the flowers towards the upper side of the peduncle, and the flowers do not spread out away from the peduncle but lie paral-



FIGURES 1-6. Distribution of southern African species of *Erythrina*.—1. *E. acanthocarpa*.—2. *E. caffra*.—3. *E. humeana*.—4. *E. latissima*.—5. *E. lysistemon*.—6. *E. zeyheri*.

lel with it. The calyx is a dull brown or sometimes green in color, while the standard is a bright scarlet (paler shades sometimes occur) and encloses the rest of the flower almost completely, until it withers. The pod is dark brown and the seeds, comparable in size with those of *E. caffra* (about 10 mm long) are orange

red with a black hilum area. The nectar, produced in quantity, is very pale and scarcely sweet to man's taste.

Erythrina zeyheri Harvey, a geophyte or underground shrub, is distributed in scattered, isolated patches now (its former distribution is unknown) throughout an area of much higher altitude than the other species discussed. It is subject to severe frosts and snowfalls fairly regularly. It occurs in the Natal midlands, the Orange Free State and Transvaal highveld, and in the lowlands of Lesotho to at least 1,750 m altitude (Fig. 6). There is a very large underground stock (hence the name "ploughbreaker") and in spring, annual, above-ground branches are produced. These give rise to large (up to 0.5 m or more long) leaves, which bear sharp thorns on both sides of the leaflet lamina, along the veins. There is usually one inflorescence (rarely two) on each shoot, and flowering is in summer (November–January). The head of flowers is upright on a long, ribbed peduncle of the same color as the standards. The calyx is a slightly paler shade of the standard color, which is most often bright scarlet but may, in at least one population, be cream through pale to dark pink to scarlet or crimson on different plants. The alae, which are small and concealed, are scarlet (or the appropriate shade of the standard color) with a white margin, while the carina is greenish white tinged with the standard color. The stamens have green yellow filaments with brown anthers and form a fan below the gynoecium when the flower opens. The flower opens only slightly, and is borne in a dependent position, parallel with the upright peduncle. The moderately large pods are black brown and contain fairly large seeds (15 mm diam.); these are a dull red with the usual black hilum patch. A slightly sweet, pale yellow nectar is produced in moderate quantity.

POLLINATORS, CASUAL VISITORS AND POSSIBLE THIEVES

Nothing is so far known of the possible pollinating agents of *E. acanthocarpa*, nor of its nectar.

Erythrina caffra, in the eastern Cape Province, is visited regularly in great numbers by red-wing starlings (*Onychognathus morio*). Frequent but less numerous visitors which also search the flowers are cape weavers (*Ploceus capensis*), black-headed orioles (*Oriolus larvatus*), and european starlings (*Sturnus vulgaris*), this last an introduced species which is increasing its range rapidly. Less frequent visitors but still common, are, in this area, yellow weavers (*Ploceus subaureus*), spotted-back weavers (*P. cucullatus*), forest weavers (*Symplectes bicolor*), wattled starlings (*Creatophora cinerea*), pied starlings (*Spreo bicolor*), fork-tailed drongos (*Dicrurus adsimilis*), lesser double-collared sunbirds (*Cinnyrius chalybeus*), greater double-collared sunbirds (*Cinnyrius afer*), collared sunbirds (*Anthreptes collaris*), grey sunbirds (*Cyanomitra veroxii*), black sunbirds (*Chalomitra amethystina*), cape parrots (*Poicephalus robustus*), speckled colis (*Colius striatus*), and red-billed hoopoes (*Phoeniculus purpureus*). A visitor in numbers and fairly frequent is the cape white-eye (*Zosterops pallidus*), but because of its size—it is a very small bird—it is not considered a pollinator except by chance. Bats have been observed at night around *E. caffra* trees and may possibly do some pollinating, but as the species is unknown, it may be an insect feeder

only. In Natal, *E. caffra* is visited by many of the species listed above and also by Layard's bulbul (*Pycnonotus barbatus layardi*) and Indian mynahs (*Acridotheres tristis*), an introduced bird now dominating the avian fauna in Durban and surroundings. This bird, the mynah, according to information received from Mrs. Hennessy, visits the flowering *E. caffra* in large flocks. The birds apparently not only make beak holes near the base of the standard but also nip the flowers off the peduncles, so that a shower of blossoms falls to the ground while the birds are "working" the tree. In spite of this, fruit set is good.

Erythrina humeana is visited by sunbirds in the eastern Cape, but in Natal, the cape white-eye (*Zosterops pallidus*) appears to be the most frequent visitor and the main pollinating agent, as seed is regularly set in quantity.

Erythrina latissima is reported by Mrs. Hennessy as being visited by bulbuls, mynahs, and drongos. There are probably other visitors effecting pollination.

Erythrina lysistemon is regularly visited by Indian mynahs in those parts where this bird occurs and other visitors are bulbuls, sunbirds, and fork-tailed drongos. Again, there are probably many other bird species which visit this plant and bring about pollination.

Erythrina zeyheri is found in Lesotho in areas where malachite sunbirds occur. This bird (*Nectarinia famosa*) is often seen probing the flowers for nectar and possibly insects and seed set is fairly good. Probably the same species of bird can be found on these plants in the other areas where *E. zeyheri* grows.

Erythrina crista-galli L., an introduced species often grown in public and private gardens in South Africa, has been seen by Skead to be visited for nectar by greater double-collared sunbirds and black sunbirds in the eastern Cape Province. The shape and direction of the inflorescence, the strength of the peduncle and the type of opening of the flowers (standard widely reflexed in *E. caffra*, enclosing the rest of the flower in *E. humeana*) seem all to have a close relationship to the species of indigenous birds which frequent the flowers at anthesis, but more detailed study is necessary. The quantity and quality of the nectar produced requires investigation also. Skead reports that he has noted speckled colis feeding heavily on *Aloe* nectar, then dropping further down the plant to drink water collected in the troughs of the leaves after recent rain; this shows the birds distinguish between the nectar and the rain water. No such observation has been made for *Erythrina* species, however, and this may be because the nectar produced is only slightly sweet, far less so than *Aloe* nectar. Skead also reports speckled colis (*Colius striatus*) eating (or tearing) the edges of *E. caffra* leaves.

Seed set is usually fair to good in the species of *Erythrina* discussed. These seeds can be seen in the open pods still attached to the pedicels and sometimes the whole pod falls, complete with seeds exposed within; at other times, individual seeds fall to the ground. Many birds search the ground under *Erythrina* trees and shrubs in southern Africa, notably laughing doves (*Stigmatopelia senegalensis*), cape turtle doves (*Streptopelia capicola*) and red-eyed doves (*Streptopelia semitorquata*). Though there may be a plentiful supply of the red seeds of these erythrinas on the ground, the birds do not touch them, while readily picking up wheat or maize grains and other, indigenous, seeds and fruits.

LITERATURE CITED

- ACOCKS, J. P. H. 1975. Veld Types of South Africa. Botanical Research Institute, Department of Agricultural Technical Services, Pretoria.
- BATTEN, A. & H. BOKELMANN. 1966. Wild Flowers of the Eastern Cape Province. Books of Africa (Pty) Ltd, Cape Town.
- COATES PALGRAVE, K. 1977. Trees of Southern Africa. C. Struik, Cape Town.
- GLEDHILL, E. 1969. Eastern Cape Veld Flowers. Department of Nature Conservation, Cape Town.
- HENNESSY, E. F. 1972. South African Erythrinas. Natal Branch, Wildlife Protection & Conservation Society of South Africa, Pinetown.